

The Examiner rejected claims 1-18 under 35 U.S.C. § 112, paragraph # 2, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. In particular, the Examiner objected to the Markush groups recited in claims 1, 3, 5 and 8 and provided corrections thereto. The Examiner will appreciate that the applicants have incorporated these suggestions as needed in the amended claims, but only with the express understanding that the insertion of "selected from the group consisting" does not affect the intended scope of elements recited in the original claim and, instead, is only added simply to clarify that the grouping of elements is not open-ended.

The Examiner rejected claims 1 and 10 under 35 U.S.C. § 102(b) as being anticipated by WO 99/58228. The Examiner noted that WO 99/58228 discloses a process for oxidizing gaseous pollutants in a flue gas stream composed of flue gases, water vapor and mercury vapor by injecting chlorine while the flue gas stream temperature is greater than 100°C in order to react the chlorine to oxidize the mercury and then adding alkali metal halogen salt to precipitate the mercury.

The Examiner rejected claims 4, 11, 12 and 14 under 35 U.S.C. § 103(a) as being unpatentable over WO 99/58228. The Examiner conceded that the reference does not specifically disclose the temperature of the flue gas is between 125° and 200°. However, the Examiner concluded that it would have been obvious to one of ordinary skill in the art to use the claimed temperatures according to the process disclosed in WO 99/58228 because, absent a showing of unexpected results, the reference discloses a "temperature greater than 100°C". Also, the Examiner noted that WO 99/58228 does not disclose that substantially all of the elemental mercury is oxidized, but nevertheless concluded that one of ordinary skill in the art could optimize the teachings of the reference in order to form a desired amount of product absent unexpected results*.

The Examiner rejected claims 5, 6 and 15 under 35 U.S.C. § 103(a) as being unpatentable over WO 99/58228 as applied to claim 1 and further in view of Downs (U.S. Patent No. 6,284,199). The Examiner conceded that WO 99/58228 does not disclose removal of oxidized mercury through the use of hydrogen sulfide or sulfide species. However, the Examiner

* In discussing this point, the office action actually reads "in view of unexpected results"; however, the Examiner corrected a similar error in the previous paragraph of the action by striking through "in view of" and penciling in "absent". For the purposes of this point, applicants have assumed that a similar error was made here, as a literal reading of the Examiner's statement implies that one of ordinary skill would actually foresee unexpected results.

concluded that it would have been obvious to one of ordinary skill in the art to use sulfides to treat the gas because Downs teaches supplying these to oxidize mercury and form an insoluble precipitate which cannot be reduced back to vaporous mercury (and is therefore removed from the flue gas). The Examiner further opined that combining halogen salt precipitation of WO 99/58228 with sulfide precipitation as taught by Downs is *prima facie* obvious because it is a substitution of equivalents for the same purpose.

The Examiner rejected claims 2, 3, 7-9, 13 and 16-18 under 35 U.S.C. § 103(a) as being unpatentable over WO 99/58228 alone or in combination with Downs, both as applied to claims 1 or 5 above, and in further view of the Zhao article from August 1999. The Examiner conceded that none of the aforementioned references disclose that aqueous chlorine comprises an oxi-acid or a salt of an oxi-acid. Nevertheless, the Examiner concluded that Zhao teaches the capability of hypochlorite to dissolve mercury has long been recognized to dissolve mercury by using sodium or potassium hypochlorite and hypochlorous acid and that aqueous hypochlorite, such as NaOCl, is also effective in absorbing elemental mercury vapor at high pH levels.

Claim 15 has been cancelled, and *inter alia*, the limitation from claim 3 has been incorporated into amended claim 1 in order to more particularly distinguish and define the elements of Applicant's invention. Claim 8 was also amended to correct an informality. Additional changes have been made as to the dependency or content of dependent claims 3, 5, 6, 8, 14 and 18. Notably, because amended claim 1 is the only independent claim in the case, amendment of this claim will also serve to more particularly distinguish and define the elements of the remaining dependent claims. Accordingly, claims 1-14 and 16-18 remain in the case.

Initially, the Examiner will appreciate that the applicants have amended the specification to better clarify that they intended to file this application as a continuation-in-part of the now issued Downs patent. The Examiner will note that Mssrs. Downs and Bailey are common inventors on present application and the Downs patent and that both parent applications were copending as of the filing date of the present application, such that classification of the present application as a continuation-in-part is proper. Notably, the additional subject matter of the present application, in comparison to the parent applications (now issued as the Downs patent and as U.S. Patent No. 6,503,470), is directed toward the use of chlorine in mercury removal processes. The previous teachings of the parent applications (*inter alia*, use of hydrogen sulfide

or other sulfides to capture mercury within the scrubber) are common with, and substantially the same as, the remainder of the present application.

Furthermore, McDermott Incorporated, which is itself a subsidiary of McDermott International Incorporated, was, at the time the invention described in the present application was conceived, and as of this date continues to be, the parent company of wholly owned subsidiaries McDermott Technology Incorporated and the Babcock & Wilcox Company (although the later is separately consolidated for accounting purposes in light of its now pending bankruptcy filing pursuant to United States' law). Therefore, pursuant to example 1 under "Definition of Common Ownership" in MPEP 706.02(1)(2), the undersigned attorney avers that the Downs patent and the present application were commonly owned at the time the later invention was conceived.

Given the previous two paragraphs, applicants submit that the Downs patent does not qualify as prior art. Thus, any rejection relying upon Downs as prior art is misplaced.

Nevertheless, applicants believe that the teachings of WO 99/58228 are patentably distinguishable from the teachings of Downs and/or the present application. In particular, at page 2, line 18 through page 3, line 8 of WO 99/58228, the reference sets forth that use of chlorine helps to remove pollutants, including H₂S, followed by the subsequent scrubbing with water and treatment with sufficient alkali metal halogen salts in order to precipitate mercuric iodide from the water. As such, the reference only teaches the use of halogens for mercury removal; moreover, through its identification of hydrogen sulfide as an undesirable pollutant which is to be removed by the chlorine, the reference further implies and teaches away from the use of hydrogen sulfide in any capacity, let alone its use as the actual means by which mercury is removed. In essence, despite the teachings and suggestions of WO 99/58228, Downs and the present invention alone discovered and utilized hydrogen sulfide, or other sulfide salts, to capture and remove mercury.

Another significant distinction between the present application/Downs and WO 99/58228 resides in the fact that WO 99/58228 only contemplates the use of water scrubbers. At page 1, lines 24-25, the reference specifically cites limestone scrubber systems as being flawed because of their tendency to re-release mercury once it is captured. Therefore, WO 99/58228 only contemplates use of water, or pH-adjusted water solutions, for the addition of chlorine, and the reference specifically teaches away from the feasibility of the present invention and Downs insofar as both specifically contemplate particular application in existing limestone-based wet

**AMENDMENT AND
PETITION FOR EXTENSION OF TIME**

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scrubber. Amended claims 3, 5, 14 and 18, along with corresponding dependent claims 6, 8, 9 and 15-17 further underscore this point.

Finally, the Examiner's attention is directed to the Supplemental Information Disclosure Sheet, enclosed herein. The undersigned attorney avers that, because of the issue date of September 10, 2002, for the patent cited in the IDS, he did not become aware of this reference until he began preparing a response to the office action dated July 17, 2002. Additionally, because a final office action has not been issued for the present application, no fee under 37 C.F.R. § 1.17(p) is due. Nevertheless, in light of the amendment and remarks above, the applicants submit that this particular reference does not negatively impact the patentability of the amended claims.

In light of the foregoing, Applicant respectfully submits that, by this amendment, the present application is now in condition for allowance, and such action is hereby requested.

CERTIFICATE OF MAILING

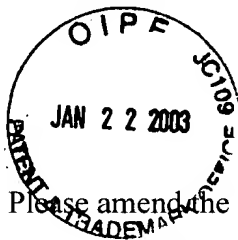
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MARKED-UP VERSION TO SHOW CHANGES

Please amend the first paragraph of the specification (page 1, lines 6-10) to read as follows:

This application is ~~related to~~ a continuation-in-part of U.S. Patent Application Serial Nos. 09/282,817 ("~~Use of Sulfide-Containing Gases and Liquors for Removing Mercury from Flue Gases,~~" filed on March 31, 1999), now issued U.S. Patent No. 6,284,199, and 09/464,806 ("~~Use of Sulfide-Containing Liquors for Removing Mercury from Flue Gases,~~" filed on December 17, 1999), now issued U.S. Patent No. 6,503,470, which are both incorporated by reference herein.

Please cancel claim 15 and amend claims 1, 3, 5, 6, 8, 14 and 18 as follows:

We claim:

1. (amended) A method for controlling total mercury emissions in a flue gas comprising:

providing a flue gas at a selected temperature and having a quantity of elemental mercury;

treating the flue gas to convert the elemental mercury to oxidized mercury with at least one selected from the group consisting of: chlorine and aqueous chlorine species; and

removing the oxidized mercury from the flue gas subsequent to and separately from the chlorine treatment step by treating the flue gas with at one selected from the group consisting of: hydrogen sulfide and an aqueous sulfide species.

3. (amended) A method according to claim 1, wherein the removing the oxidized mercury includes the use of a scrubbing liquor containing an alkali reagent 2, ~~wherein the removing mercury step comprises treating the flue gas with at least one of:~~ hydrogen sulfide gas ~~and an aqueous sulfide species.~~

5. (amended) A method according to claim 3, wherein the aqueous chlorine species comprises an oxi-acid 1, ~~wherein the removing mercury step comprises treating the flue gas with at least one of:~~ hydrogen sulfide gas ~~and an aqueous sulfide species.~~

6. (amended) A method according to claim 3 ~~5~~, wherein the selected temperature of the flue gas is between 125°C and 200°C.

8. (amended) A method according to claim 5 ~~2~~, wherein the oxi-acid is at least one selected from the group consisting of: Cl₂O, ClO₂, ClO₄, ClO, HClO, HClO₂, HClO₃, and HClO₄.

14. (amended) A method according to claim 3 ~~4~~, wherein substantially all of the elemental mercury is converted to oxidized mercury.

18. (amended) A method according to claim 5 ~~1~~, wherein the aqueous chlorine species comprises a salt of an oxi-acid.